

First report of naturalization of *Houttuynia cordata* Thunb. 1783 (Piperales: Saururaceae) in South America

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ABSTRACT: A relatively large and established population of *Houttuynia cordata* from Itatiaia National Park in Brazil represents the first record of naturalized Saururaceae in South America. Although the species is potentially invasive, unknown mechanisms have prevented its spread to other localities between 1940, when it was recorded in cultivation in Brazil, and the present. The nearest known naturalized population is situated 5,600 km away, in Costa Rica, Central America.

The natural distribution of the Saururaceae (Piperales), with six species in four genera, is restricted to North America and Southeast Asia (Brach and Nian-he 2005). *Houttuynia cordata* Thunb. is a sciophilous, hygrophytic herb native to Japan, North and South Korea, China, Nepal, Taiwan, Vietnam, India, Myanmar, Indonesia, Thailand, and Bhutan (eFloras 2008; Nian-he and Brach 1999; Brach and Nian-he 2005). Popularly known (in English) as chameleon plant, Chinese lizard tail, Fishwort or Heartleaf (Uni-Graz 2012), it is widely used in Southeast Asia for ornamental (Frank and Dana 2012), culinary (Puttawong and Wongroung 2009) and medicinal purposes (Hsu et al. 1999; Chang et al. 2001; Ng et al. 2007; Shin et al. 2009; Pawinwongchai & Chanprasert 2011; Wei and Wu 2012). In China, Xu et al. (2011) have considered that the high demand, especially for medicinal use, has endangered natural populations of *H. cordata*.

Plants of *H. cordata* are 30–60 cm tall, with horizontal rhizomes or stolons that connect the erect aerial stems. The leaves, which are alternate, entire, cordate, and have a sheathing base, are reminiscent of certain species of *Piper* (Piperaceae) with heart-shaped leaves (Figure 1). The leaves, which can measure up to 10 cm long × 6 cm wide, are usually green but can turn purplish when the plants are exposed to full sun. The terminal inflorescences consist of dense spikes (1.5–2.5 cm long) of very small flowers without petals, but each inflorescence has four white bracts at the base and resembles a single flower (Figure 2). The fruits are tiny (2–3 mm long), with 9 to 18 seeds in each (Nian-he and Brach 1999; Brach and Nian-he 2005). Because of the flower-like inflorescence, *H. cordata* can be confused with members of other angiosperm families (e.g., Ranunculaceae or even Rosaceae).

This species has become naturalized and even invasive in New Zealand, Madagascar, United States (California, Georgia, Hawaii, Louisiana, Washington), and Costa Rica (Global Invasive Species Database 2012; Missouri Botanical Garden 2012). Non scientific internet sources

also suggest an invasive behavior in other states of the USA, such as Illinois and Kansas, and in Australia. It has been in cultivation in Europe at least since 1826 (Hooker 1827), where it is appreciated as an attractive ground cover. Although reports of the invasiveness or aggressive growth of *H. cordata* in the scientific literature are scarce (e.g. Staples et al. 2000, for Hawaii), they are frequent in horticultural blogs and other websites. Two commonly cited causes for the difficulty to control or remove this species (after its initial planting as an ornamental) are the rapid vegetative propagation through the abundant production of rhizomes or stolons (or their fragments), and the resistance of the plants to herbicides. *Houttuynia cordata* also reproduces parthenogenetically (Mihara 1960, Shibata & Miyake 1908), and normal sexual reproduction has not yet been demonstrated (Wei and Wu 2012). It has been suggested that *H. cordata* has the potential to displace native plants in forest and wetland ecosystems (Global Invasive Species Database 2012).



FIGURE 1. Habit of *Houttuynia cordata* in Itatiaia National Park, October 29th, 2012. Note the cordate (heart-shaped) leaves. Photo: R.J.V. Alves.



FIGURE 2. Detail of the inflorescence of *Houttuynia cordata* in Itatiaia National Park, October 29th, 2012. Note the four white, petal-like bracts at the base of the spike and three yellow stamens per individual flower. Photo: R.J.V. Alves.

The naturalized population of *H. cordata* documented here occurs in the Itatiaia National Park in Brazil, near the intersection of the borders of Rio de Janeiro, São Paulo, and Minas Gerais states (voucher: BRASIL. Rio de Janeiro, Parque Nacional do Itatiaia, beiras de estrada entre a Lagoa Azul e a Casa dos Pesquisadores; 930–1115 m s.m., 22°26'42"–22°25'37" S, 044°36'39"–44°37'13" W, D. Medeiros 405 (R 213593); Figures 1, 2, 3, 4). The only other South American herbarium collection of *H. cordata* that we are aware of is that of a cultivated plant from the Rio de Janeiro Botanic Garden (collected on October 1940 by A. Liberato Barroso, R no. 58460). The nearest reported naturalized population is from Costa Rica, Central America, at ca. 1300 m s.m. in Braulio Carrillo National Park (Missouri Botanical Garden 2012; Figure 3), 5,600 km NNW from Itatiaia.

This record of *H. cordata* is the first case of a naturalized population of the family Saururaceae for South America. No previous records representing naturalized populations of this species in South America are available in several major databases consulted (Missouri Botanical Garden 2012; Lista de Espécies da Flora do Brasil 2012; Sinbiota 2.0 2012; JBRJ 2012) nor in the major herbaria of Rio de Janeiro state (R, RB).



FIGURE 3. Location map indicating our collection of *Houttuynia cordata* (red star) in Itatiaia National Park, Rio de Janeiro, Brazil, and the nearest known location documented in herbaria, 5,600 km away, in Costa Rica, Central America (pink star).

Houttuynia cordata has not been listed in Brazilian compendia of ornamental plants (Lorenzi and de Souza 1995), medicinal plants (Lorenzi and Matos 2008), or weeds (Lorenzi 2008). However, the species has the potential to become invasive due to its high vitality (Global Invasive Species Database 2012) and its status as a useful plant may contribute to anthropic range expansion. The fact that this species has not propagated insofar beyond the boundaries of Itatiaia (an intensely visited National Park:) where *H. cordata* forms large stands by shaded roadsides and where many vehicles and tourists pass on a daily basis may be due to the absence of effective dispersal agents and to control (the entire population was mowed by the National Park staff a week after our first visit: Figure 4).



FIGURE 4. A dense stand of *H. cordata* freshly mowed by staff from Itatiaia National Park, November 8th, 2012.

ACKNOWLEDGMENTS: We thank Léo Nascimento, Conselho Nacional de Pesquisa (CNPq) for grants to RJVA, DM, KA, RM; and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) to NGS and CM. Our collection was authorized by Federal permit SISBIO-36704-1 in the name of Débora Medeiros.

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RECEIVED: November 2012

ACCEPTED: May 2013

PUBLISHED ONLINE: June 2013

EDITORIAL RESPONSIBILITY: Angelo G. Manzatto